Cerebral air embolism: an unusual case of transient ischemic attack

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Introduction

Cerebral air embolism related with central venous catheter insertion and removal is an uncommon but dangerous complication. Frequency ranges from 0.1% to 2% with a total mortality rate of 23% (1).

Case report

A 76-year old man was admitted to the Hospital for a right heart failure due to severe pulmonary hypertension during an exacerbation of chronic respiratory failure. He suffered from severe diffuse vascular disease; mainly in the supra aortic vessels with bilateral occlusion of internal carotid artery and occlusion of the left vertebral artery. To assure intensive treatment a central venous catheter was placed in the subclavian vein. Once the general condition was stable, the catheter was removed.

After fifteen minutes, the patient briefly lost consciousness and soon after developed left-sided weakness. An urgent brain CT scan revealed a massive air embolism mostly in the right hemisphere involving either cortical and deep small vessels highlighting a wide collateral circulation (Figure A, B). Furthermore, air bubbles were also in the carotid canal (Figure C) and bilaterally in the cavernous sinuses (Figure D). The bone window CT image ruled out fractures or bony erosion in the skull base or ethmoid sinus. In the next two hours, the neurological symptoms gradually improved till complete resolution. A control brain CT scan revealed spontaneous disappearing of the air inside the vessels. Furthermore, no abnormalities were found in pulmonary CT.

Discussion

This is a rare case of transient ischemic attack caused by arterial and venous air embolism in a patient with occlusion of three out of four supra-aortic vessels. The intracranial circulation was supported by a diffuse cortical collateral flow that become apparent through the localization of air bubbles in the first CT scan. The increased pressure in the right heart due to the pulmonary hypertension and heart failure might have caused a massive passage of air from the venous to the arterial system through an intra-cardiac defect. As a matter of fact, echocardiogram confirmed a patent foramen ovale and no pulmonary shunts were found. The presence of air embolism in both cavernous sinuses could have an anterograde or retrograde origin.

Previous studies have demonstrated that air bubbles have a high probability of rising retrograde against venous blood flow. This depends on bubble size, central vein diameter, cardiac output, and the position of the patient’s head (2).

References


Schlimp CJ, Bothma PA, Brodbeck AE. Cerebral venous air embolism: what is it and do we know how to deal with it properly? JAMA 2014 Feb;71(2):243.